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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/782,485	02/19/2004	Thomas L. Toth	GEMS8081.211	5659

7590 05/25/2005

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EXAMINER

KAO, CHIH CHENG G

ART UNIT PAPER NUMBER

2882

DATE MAILED: 05/25/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/782,485

Applicant(s)

TOTH ET AL.

Examiner

Chih-Cheng Glen Kao

Art Unit

2882

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-8 is/are allowed.
- 6) ☒ Claim(s) 9-13 and 15-20 is/are rejected.
- 7) ☒ Claim(s) 14 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2/19/04</u> . | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character “84” has been used to designate both a flexible cable in Figure 4 and a waveform in Figure 6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: (fig. 5, “C_L”).

Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The specification is objected to because of the following informalities, which appear to be minor draft errors including spelling and grammatical issues.

Art Unit: 2882

In the following format (location of objection; suggestion for correction), the following corrections may obviate their respective objections: (page 2, line 7, “serve”; replacing “serve” with - -severe- -), (page 11, lines 14-15, “addition modulation points, or magnitude e.g. ninety percent of peak-to-peak modulation amplitude”; replacing “addition” with - -additional- -, deleting the comma, replacing “magnitude” with - -magnitudes- -, inserting an opening parentheses before “e.g.”, and inserting a closing parentheses and comma after “amplitude”), (page 13, line 12, “It also”; inserting - -is- - before “also”), and (page 13, line 18, “alone”; replacing “alone” with - -above- -).

Appropriate correction is required.

Claim Objections

3. Claims 8 and 9 are objected to because of the following informalities, which appear to be minor draft errors including lack of antecedent basis problems.

In the following format (location of objection; suggestion for correction), the following corrections may obviate their respective objections: (claim 8, lines 1-2, “the waveform”; inserting - -indicative of at least one of subject size and subject shape- - after “waveform”) and (claim 9, line 12, “the photodiode outputs”; deleting “the”).

For purposes of examination, the claims have been treated as such. Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 9-11 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toth et al. (US Patent 5450462) in view of Hoffman (US Patent 6115448).

5. Regarding claim 9, Toth discloses a system comprising a gantry (fig. 1, #12) having an opening (fig. 1, #11) to receive a subject (fig. 1, #15) to be scanned, a high frequency electromagnetic energy projection source (fig. 2, #13) configured to project a high frequency electromagnetic energy beam (fig. 2, #14) toward the subject (fig. 2, #15), a data acquisition system connected to a detector array and configured to receive the detector outputs (fig. 2, #24, "DAS"), an image reconstructor (fig. 2, #25) connected to the DAS (fig. 2, #24) and configured to reconstruct an image of the subject (fig. 2, #15) from the detector outputs received by the DAS (fig. 2, #24), and a computer (fig. 2, #26) programmed to determine an ideal tube current modulation (col. 4, lines 55-62, optimal α) waveform (fig. 3) to control projection of high frequency electromagnetic energy (fig. 2, #14) by the high frequency electromagnetic energy projection source (fig. 2, #13) for CT data acquisition (fig. 2, #24) from the subject (fig. 2, #15), evaluate the ideal tube current modulation waveform at a plurality of magnitudes (col. 5, lines 19-26), and determine an approximate tube current modulation waveform from values at the plurality of magnitudes (col. 5, line 37-40).

However, Toth does not disclose a scintillator array having a plurality of scintillator cells, wherein each cell is configured to detect high frequency electromagnetic energy passing through a subject and a photodiode array optically coupled to the scintillator array and comprising a plurality of photodiodes configured to detect light output from a corresponding scintillator cell.

Hoffman teaches a scintillator array having a plurality of scintillator cells (fig. 4, #56), wherein each cell is configured to detect high frequency electromagnetic energy (fig. 2, #16) passing through a subject (fig. 2, #22) and a photodiode array (fig. 4, #52) optically coupled to the scintillator array (fig. 4, #56) and comprising a plurality of photodiodes configured to detect light output from a corresponding scintillator cell (col. 3, lines 30-38).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Toth et al. with the scintillator and photodiode arrays of Hoffman, since one would be motivated to make such a modification for a higher density array (col. 1, lines 50-51) as implied from Hoffman and better image resolution.

6. Regarding claim 10, Toth et al. further discloses the computer (fig. 2, #26) further programmed to control the high frequency electromagnetic energy projection source (fig. 2, #13) such that high frequency electromagnetic energy projection (fig. 2, #14) toward the subject (fig. 2, #15) conforms to the approximate tube current modulation waveform (col. 5, lines 37-40).

7. Regarding claim 11, Toth et al. further discloses the computer (fig. 2, #26) further programmed to determine the ideal tube current modulation waveform from a scout scan (fig. 4, #110).

8. Regarding claim 15, Toth et al. further discloses the plurality of magnitudes including three separate magnitudes (col. 5, lines 9-15) on a normalized ideal tube current modulation waveform (fig. 3).

9. Regarding claim 16, Toth et al. as modified above suggests a system as recited above. Toth et al. further discloses magnitudes corresponding to values at a percent of peak waveform magnitude (col. 5, line 29).

However, Toth et al. does not disclose three magnitudes corresponding to values at 10, 90, and 100 percent of peak waveform magnitude.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Toth et al. as modified above with magnitudes corresponding to values at 10, 90, and 100 percent of peak waveform magnitude, since discovering a value of a result effective variable involves only routine skill in the art. One would be motivated to make such a modification to ensure that the dose is not modulated below a certain limit (col. 4, lines 41-43) as implied from Toth et al.

10. Regarding claim 17, Toth et al. further discloses increasing in number the plurality of magnitudes that are evaluated to reduce differences between the ideal and approximate tube current modulation waveform (col. 5, lines 19-21).

Art Unit: 2882

11. Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toth et al. and Hoffman as applied to claim 11 above, and further in view of Toth (US Patent 5379333).

Toth et al. as modified above suggests a system as recited above.

However, Toth et al. does not disclose carrying out a scout scan to determine a size and a shape of a subject from data in one-quarter of gantry rotation.

Toth teaches carrying out a scout scan to determine a size and a shape of a subject from data in one-quarter of gantry rotation (figs. 6a and 6b).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system of Toth et al. as modified above with the scout scanning of Toth, since one would be motivated to make such a modification to better detect differences in attenuation profiles due to human anatomy (col. 6, lines 9-21) as implied from Toth.

12. Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toth et al. in view of Toth.

13. Regarding claim 18, Toth et al. discloses a computer readable storage medium having a computer program stored thereon and representing a set of instructions that when executed by a computer (fig. 2, #26) causes a computer to command a radiographic data acquisition system (fig. 1) to carry out a scout scan (fig. 4, #110), determine a first tube current modulation waveform ideal (col. 4, lines 54-63, optimal α) for subject size and subject shape from pre-scan data (fig. 4, #110), evaluate a portion of the first tube current modulation waveform

Art Unit: 2882

corresponding to ninety degrees of gantry rotation (col. 5, lines 19-26), and determine a second tube current modulation waveform that approximates the first tube current modulation waveform from the portion of the first modulation waveform (col. 5, line 37-40).

However, Toth et al. does not specifically disclose acquiring pre-scan data indicative of subject size and subject shape.

Toth teaches acquiring pre-scan data indicated of subject size and subject shape (figs. 6a and 6b).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the medium of Toth et al. with the pre-scan data of Toth, since one would be motivated to make such a modification to better detect differences in attenuation profiles due to human anatomy (col. 6, lines 9-21) as implied from Toth.

14. Regarding claim 19, Toth et al. further discloses causing the computer (fig. 2, #26) to normalize (fig. 3) the portion of the first tube current modulation waveform to a peak magnitude of one and determine the second tube current modulation waveform by evaluating more than two points along the normalized portion of the first modulation waveform (col. 5, lines 19-26).

15. Regarding claim 20, Toth et al. further discloses causing the computer (fig. 2, #26) to control an x-ray source (fig. 2, #13) to project x-rays (fig. 2, #14) toward a subject (fig. 2, #15) based on the second tube current modulation waveform (col. 5, lines 37-41).

Allowable Subject Matter

16. Claims 1-8 contain allowable subject matter. Claim 14 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and all intervening claims.

17. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 1, prior art does not disclose or fairly suggest a method including the steps of determining a modulation factor at a plurality of modulation points and generating a modulation tube current waveform that substantially approximates a waveform indicative of at least one of subject size and subject shape based on a modulation factor at the plurality of modulation points. Claims 2-8 contain allowable subject matter by virtue of their dependency.

Regarding claim 14, prior art does not disclose or fairly suggest a system including wherein an ideal tube current modulation is a function of oval ratio and minimum subject diameter during a one-quarter quantity rotation cycle, in combination with all the limitation in the claim, all intervening claims, and the base claim.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571) 272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).


Art Unit: 2882

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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